Small Business Innovation Research/Small Business Tech Transfer

RadFlexPro, Phase I

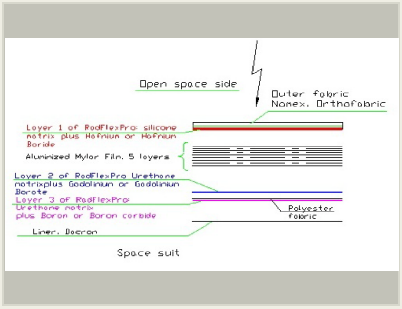
Completed Technology Project (2013 - 2013)

Project Introduction

Our proposed multilayered, flexible, graded Z radiation shielding, RadFlexPro, provides radiation protection for astronauts in EVA for NASA's future space missions. RadFlexPro can be integrated into current space suit TMG designs and act as multifunctional layers, providing additional protection from micrometeoroids. Current RadFlexPro designs have three layers. The outer layer serves as a first barrier to decelerate high speed and high energy particles: the following layer decelerate particles more, and the final layer protects from possible secondary radiation. It is proposed that RadFlexPro will significantly increase radiation protection without compromising bulk and mobility in a space suit. RadFlexPro is a composition of several materials and layers, with different properties selected to protect against various types of radiation. Compared to single-material shielding, such as Demron, the same mass of Graded-Z coating shows increased radiation opacity; as an alternative, a lower mass of graded z shielding can provide the same level of protection as a single material sheild. In a typical graded-Z shield, the high-Z layer effectively scatters protons and electrons. Because the matrix of RadFlexPro is adjustable, the coating can be sprayed on surfaces, rolled or laminated, and/or dipped into solution. A matrix solution can be made with different viscosities and densities to suit several bonding techniques. Coated fabrics can in turn be cut out according to flat patterns and sewed with other pieces into a TMG configuration. FFD has considerable experience and hardware to sew thick, heavy, rubbery materials effectively.

Anticipated Benefits

NASA currently operates EVA in LEO without any dedicated radiation protection. Future missions for EVAs to environments like the moon, asteroids, and Mars require additional protection against radiation. RadFlexPro could serve as a method to further protect astronauts from harmful radiation for NASA. FFD is interested in working on the next generation pressurized garments for NASA's use in EVA beyond the ISS. The added radiation protection of an astronaut within a highly functional pressure garment would insure a significant advantage for NASA in future space missions. In addition, RadFlexPro is an adaptable coating strategy, which could be incorporated into vehicles for radiation protection for humans and sensitive computer equipment. Its low mass relative to solid lead or aluminum shielding and flexible application options are an economical and efficient alternative to traditidonal vehicle shielding.



RadFlexPro

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RadFlexPro, Phase I

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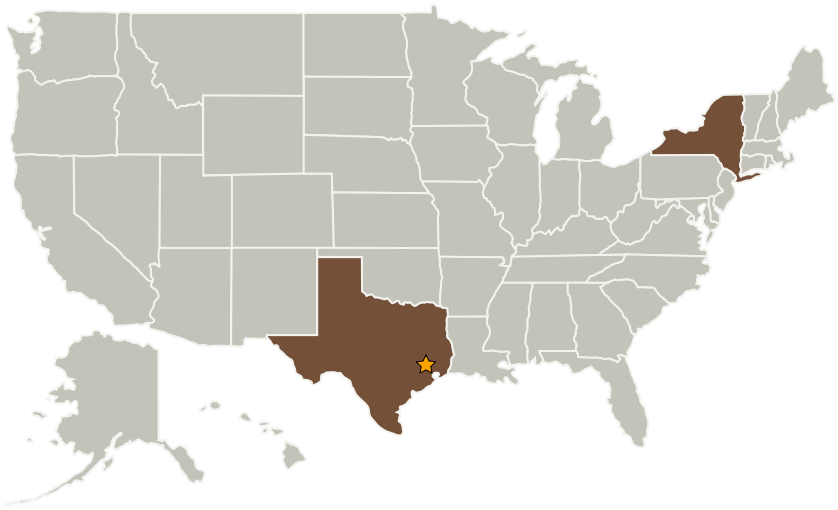
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Final Frontier Design	Supporting Organization	Industry	Brooklyn, New York

Primary U.S. Work Locations	
New York	Texas

Project Transitions

May 2013: Project Start

November 2013: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Amy J Ross

Principal Investigator:

Theodore C Southern

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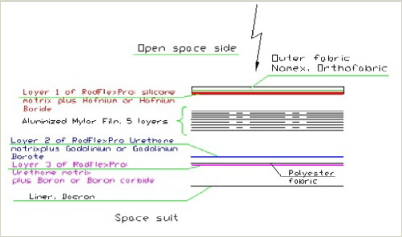
Images



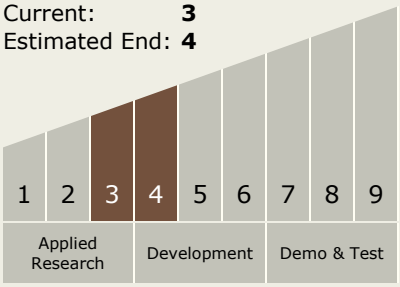
Project Image
RadFlexPro
(https://techport.nasa.gov/image/3928)

Links

Final Patent/New Technology Report
(no url provided)

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.3 Protection Systems